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PROCEEDINGS OF THE
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SERIES B. TAXONOMY

VOLUME 10. 1941.

NOTES ON BRITISH HETEROPEZINAE, WITH DESCRIPTION OF A NEW GENUS (DIPTERA, CECIDOMYIIDAE)

By the late F. W. EDWARDS, F.R.S.

THE small midges of the subfamily HETEROPEZINAE are famous on account of the habits of their larvae, which live gregariously under bark, where they reproduce by paedogenesis, small larvae developing in the bodies of the larger ones and many generations of larvae succeeding one another before a generation of adults is produced, usually in the early summer. The adults, on which classification of the group depends, are not often seen, partly on account of their small size and short period of flight, but representatives of four genera have now been found in Britain. These genera may be distinguished as follows :—

1. Tarsi with 2 or 4 segments; eyes rounded and widely separated; wing fringed but without hairs on membrane . . . . . 2.
   Tarsi with 5 segments, the first shorter than the second . . . . . 3.
2. Tarsi with 2 segments; mouth-parts practically absent; wings without any distinct veins . . . . . *Heteropeza* Winn.
   Tarsi with 4 segments, first longer than second; palpi distinct, 2-segmented; wings with 3 distinct veins, one reaching tip . . . . . *Miastor* Meinert.
3. Second tarsal segment only twice as long as first; eyes round and widely separated; palpi 1-segmented; radial vein incomplete; wing-membrane with hairs at tip only . . . . . *Leptosyna* Kieffer.
   Second tarsal segment several times as long as first; eyes bridged, each with a narrow upper portion; palpi 4-segmented; radial vein complete; wing-membrane uniformly though not densely hairy . . . . *Brittenia* gen. n.

The subfamily includes only three other recent European genera :— *Peromiastor* Kieffer, resembling *Miastor* except in having palpi only 1-segmented; *Frirenia* Kieffer, resembling *Leptosyna* except in having palpi 2-segmented; and *Brephometra* Strand (= *Pero* Meinert), discussed below under the account of the new genus *Brittenia*. Several fossil genera are insufficiently described, and a number of other genera placed in the subfamily by Kieffer (1913) and Felt (1912) appear to me to belong either to the LESTREMIINAE (*Trichopteromyia*, *Ceratomyia*) or to one or other of the tribes of CECIDOMYIINAE (*Epimyia*, *Brachyneura*, *Haplusia*, *Johnsonomyia*, *Kronomyia*).

Paedogenesis is not known in any CECIDOMYIINAE, though it has been recorded by Barnes (1929) as occurring in the Campylomyzine genus *Mycophila*.

Heteropeza Winn.

Only one European species is definitely known: *H. pygmaea* Winn. (= *Oligarces paradoxus* Meinert). This was recorded by me (1937) as British from specimens taken at Birmingham. Adults were bred by D. L. Glenn of Birmingham University (not by Dr. H. F. Barnes as stated), and are now in Dr. Barnes' collection.

Miastor Meinert.

The first record of the occurrence of this genus in Britain was by Bagnall and Harrison (1918), but this record was based on larvae only and it is not certain that the larvae belonged to this genus rather than to one of the other genera of the subfamily. *Miastor* adults are in the British Museum from Oxford, 13.vi.15 (*A. H. Hamm*); Epping Forest, vi.22 (*C. L. Withycombe*); Esher, Surrey, 25.vi.23 (*G. Fox-Wilson*); and Letchworth, Herts, vi.23, vi.26, vii.–viii.31 (*F. W. E.*). All these appear to me to belong to the same species, though there is a slight difference in the shape of the genital styles between males from Epping and those from Esher. The Epping specimens were reared from larvae found in star-shaped clusters under birch bark and recorded by Withycombe (1922) on my determination as *M. hastatus* Kieffer, though whether *M. hastatus* is distinct from *M. metraloas* Meinert is somewhat uncertain. Keilin has reared *Miastor* near Cambridge (Edwards, 1919).

Regarding the Esher specimens, Mr. Fox-Wilson writes (3.vi.40): "The adults were found swarming on the leaves of encrusted Saxifrages on a rock garden, and the pupal cases were abundant on smooth stones placed among the plants."

In 1938 Mr. E. A. Elliott brought to the Museum larvae, probably of this genus, found in star-shaped clusters under bark of poplar (?) near Norwich; the colony lived and reproduced paedogenetically for some months but no adults were reared.

Leptosyna Kieffer.

I described *L. setipennis* (1919) from specimens captured on windows at Letchworth, and though I have taken occasional specimens in the same place since then, I know of no other British records. Recently (1937) I have placed *L. setipennis* as a synonym of *L. nervosa* (Winnertz).

Brittenia gen. n.

Eyes in contact above, the bridge formed by the narrow portions of each eye three facets broad. Antennae in ♀ with 2 + 11 segments, but the last two more or less fused and rarely with a definite suture between them; flagellar segments with a few long spreading hairs about the middle, forming a single irregular verticil, and each except the last with a peculiar membranous collar close to the distal end, very suggestive of the similar collar found in *Campylomyza*; in shape most of the segments are shortly oval with very short necks. Palpi 3 or 4 segmented (the first segment strongly constricted near middle, so that it might be reckoned as two segments, making 4 in all), proportions more or less as figured, but subject to individual variation. Labella well developed. Thorax with uniserial dorso-central hairs, otherwise bare. Abdomen long and slender, segments 6–10 forming an extensile ovipositor which when fully extended is about one-third as long as the whole body; in the basal part of the abdomen of all the specimens examined are from two to six large eggs which are entirely pale and quite six times as long as broad; two small round sclerotised spermathecae similar to those of *Miastor*. Legs of moderate length, rather densely hairy but without scales; tarsi 5-segmented, second segment over three times as long as first; claws small and simple; empodium over half as long as claws.

Wings resembling those of *Miastor* in shape and venation; four longitudinal veins present, *Sc* and *R*1 lying close together and ending in costa before middle of wing (*R*1 tends to be faint and is not always readily distinguishable from *Sc*, hence *Miastor* has been said to have only three veins), *Rs* reaching tip of wing and slightly arched, *Cu* simple and reaching margin just beyond middle of wing; no break in marginal thickening at wing-tip. Fringes long, especially on hind margin; membrane of wing with dense dot-like microtrichia (as in other HETEROPEZINAE) and in addition with numerous long decumbent macrotrichia spread over the whole surface.

Genotype, the following new species :—

Brittenia fraxinicola sp. n.

A small pale reddish insect; mesonotum somewhat darkened; legs entirely pale; wings devoid of markings and with the hair uniformly distributed. Structural characters as described above and shown in fig.1; a further small point worthy of note is the presence at the base of the neck of each flagellar segment, just beyond the collar, of a few small club-shaped setae. Length of body (extended) 2–2·3 mm.; wing, 1·4–1·7 mm.

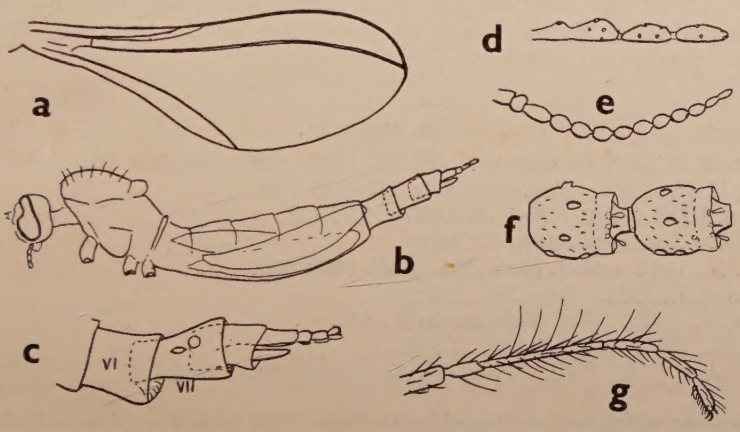

FIG. 1.—*Brittenia fraxinicola* gen. et sp. n. ♀. a, Wing-venation. b, Outline of body. c, Tip of abdomen. d, Palp. e, Outline of antenna. f, Antennal segments showing collar-like sensoria. g, Tarsus, showing proportionate lengths of segments.

YORKSHIRE: Mulgrave Woods, near Whitby, viii.1937; 18 ♀♀ taken resting on ash trunks near lower edge of wood (*H. Britten, jr.*, and *F. W. Edwards*). Type in British Museum, paratypes in British Museum and in the collection of Dr. H. F. Barnes.

No males could be found when the type material was collected, and the species was not seen at all on subsequent visits to the same spot by Mr. Britten.

The new genus is dedicated to my friends Harry Britten, senior, of Manchester, and Harry Britten, junior, late of Whitby.

In its hairy wings as well as in the shape of its eyes and the proportionate lengths of its tarsal segments, *Brittenia* differs from most HETEROPEZINAE and resembles the CECIDOMYIINAE. On this account I at first thought the genus might have been among those described in the latter subfamily, but failed to discover any description which would fit; Dr. H. F. Barnes confirmed my conclusion that the insect belonged to the HETEROPEZINAE, the main reasons for this conclusion being (1) the resemblance of *Brittenia* to *Miastor* in venation;

(2) the peculiar sensoria of the female antenna, which are unlike those of any described Cecidomyiine genus; (3) the presence of sclerotised spermathecae; (4) the small number of large eggs in the female abdomen, as in other paedogenetic forms. If correctly placed, *Brittenia* would seem to be the most generalised member of the HETEROPEZINAE.

The only Heteropezine genus which may be nearly related to *Brittenia* is *Brephometra* Strand[1] (*Pero* Meinert), which is still known only from the brief unillustrated description of Meinert (1870). *Brephometra* is said to have hairy wings and proportions of tarsal segments as in *Brittenia*, but the eyes are not described; I do not think it can be the same as *Brittenia* because Meinert describes the female of his species as having 14-segmented antennae with two verticils on each segment, and a very short ovipositor (the male of *B. fasciata* is stated to have 23 antennal segments, each with a long neck and a single verticil). *B. fasciata* must in any case be very different in appearance from *B. fraxinicola* as it is said to have dark rings on the tarsi and markings on the wings due to denser patches of hair. The antennal structure and especially the markings of the legs and wings described by Meinert are quite unlike other HETEROPEZINAE but very suggestive of *Lestodiplosis*, and one cannot help wondering whether Meinert made his description partly from a *Lestodiplosis* which was predacious on a paedogenetic species.

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FELT, E. P., 1912. *N.Y. State Mus. Bull.* **165** : 204.
KIEFFER, J. J., 1913. *Gen. Ins.* **152** : 310.
MEINERT, F., 1870. *Nat. Tidsskr.* (3) **6** : 463.
STRAND, E., 1910. *Ent. Runds.* **27** : 155.
WITHYCOMBE, C. L., 1922. *Proc. ent. Soc. Lond.* **1922** : lxxxii.

[1] This name, which was overlooked by Kieffer and Felt in their revisions of Cecidomyiid genera, was proposed by Strand (1910) as a substitute for the pre-occupied name *Pero* Meinert; it antedates *Meinertomyia* Felt (1911), which was also proposed as a substitute for *Pero*.

THE DESCRIPTIVE TERMS APPLIED TO THE PTEROTHORAX AND PENIS OF ODONATA

By J. Cowley, M.A., F.R.E.S.

It is well known that in the meso- and metathorax of the Odonata the tergites and sternites are much reduced and have shifted caudad and cephalad respectively, while the pleurites are very considerably enlarged, forming the major part of the pterothoracic surface, the mesopleura of each side meeting in the mesal line anterior to the true dorsum, so that what appears to be the dorsum of the pterothorax is morphologically a part of the pleura. In recent years there has been a tendency in describing the thorax (principally in connection with the colour-pattern) to use terms denoting directions derived from the morphological form of the thorax, with the result that if it is not expressly stated which set of terms is being used, there is confusion as to whether the directions are morphological or positional, for what are morphologically dorsal, anterior, ventral and posterior are, generally, posterior, dorsal, anterior and ventral respectively in relation to the positional aspects of the whole body. I would therefore suggest that a distinction be made between tergal (superior), pleural (anterior or posterior) and sternal (inferior) as morphological terms, and dorsal, mesal, lateral, ventral, basal (cephalic) and apical (caudal) as positional terms, and that the morphological terms be reserved for use only when the actual morphology is being described, since the majority of descriptive matter relates to the colour-pattern, and the positional terms are far easier to use and are more immediately apparent. The terms proximal and distal, applied to appendages, and extal, exterior, external, ental, interior, internal, applied to the inner and outer parts of the body, do not concern us here.

I use the term *pterothorax*, the fused wing-bearing segments of the thorax, as being more correct than *synthorax*, which properly denotes the fusion of all three thoracic segments. It is also convenient to have a term for the small triangular sclerite at the caudo-ventral corner of the metepimeron, which is separated from this area by a distinct suture; I propose to call this sclerite the (meta-) postepimeron. Also, in the Anisoptera the homology of the depressed area at the base of the mesepisterna just caudad to the pronotum is obscure; it may have been developed from the mesoprescuta or from the mesepisterna, the latter case seeming the more likely. The term (mesothoracic) collar has been applied somewhat loosely to this distinct area, but the term has also been used at times to denote either the carina forming the apical border of the area, or an element of the thoracic colour-pattern, so that it would be an advantage to have a separate unambiguous term for the area, (mes-) interepisternum.

These terms are set out fully in figs. 1–2, which represent the usual types of diagram used to figure the Zygopterous and Anisopterous colour-patterns, since it is in the description of colour-patterns that such terms are principally used.

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A few remarks are also necessary in this connection on the Odonate penis.[1] In the Zygoptera (or at least in those in which the third segment is well developed), owing to the double bend of the penis, the true ventral surface of the reflexed third segment is actually the ventral surface as determined by position; but in the penis of Anisoptera with only a single flexure the apparent ventral surface of the terminal segment (that is, the surface seen in a ventral view of the whole insect) is really the morphologically *dorsal* surface. It would therefore seem simpler and less confusing also to term the surface seen in a ventral view, the ventral surface, and if it is necessary to use strictly morphological terms, to reserve the terms superior and inferior (tergal and sternal are not appropriate here) for this use.

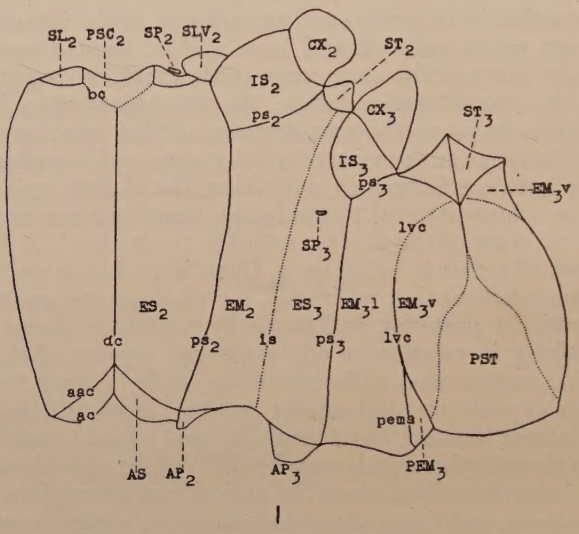

FIG. 1.—Diagram of the pterothorax, showing dorsal, right lateral and ventral surfaces. Zygopterous (based on *Protoneura*).

a, apical (caudal, morphologically tergal or superior) direction.
aac, antealar (anteapical) carina.
ac, apical carina.
AP_2, anterior alar process.
AP_3, posterior alar process.
AS, antealar sinus (parapteron).
b, basal (cephalic, morphologically sternal or inferior) direction.
bc, basal carina of mesothorax.
CX_2, mesocoxa.
CX_3, metacoxa.

[1] The use of the term *penis* for the intromittent organ of the second abdominal segment of Odonata may be questioned; properly the penis in Insecta, as defined by Snodgrass (1935, *Principles of Insect Morphology*), is one of the paired intromittent organs, or the usual median phallic organ (*i.e.*, associated with the ectodermal outlet duct of the male genital system). Snodgrass terms the Odonate "penis" a *secondary* penis, since there are rudiments of the true penis on the ninth abdominal sternite. Other terms, such as phallus or aedeagus, are similarly inappropriate for the Odonate organ; indeed, the term *penis* for it is so well established that it is scarcely necessary to invent a special new term, provided that when required on account of possible confusion or strict accuracy the defining epithet *secondary* is prefixed.

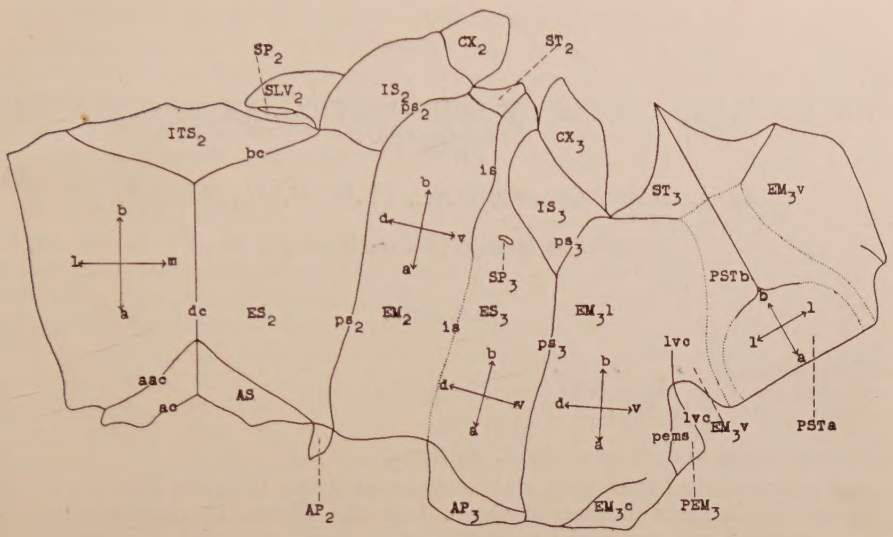

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FIG. 2.—Diagram of the pterothorax, showing dorsal, right lateral and ventral surfaces. Anisopterous (based on *Onychogomphus*).

d, dorsal (morphologically anterior) direction.
dc, dorsal carina.
EM_2, mesepimeron.
EM_3c, caudal part of metepimeron.
EM_3l, lateral part of metepimeron.
EM_3v, ventral part of metepimeron.
ES_2, mesepisternum (mesanepisternum, mesosupraepisternum).
ES_3, metepisternum (metanepisternum, metasupraepisternum).
is, interpleural (first lateral) suture.
IS_2, mesinfraepisternum (mesokatepisternum).
IS_3, metinfraepisternum (metakatepisternum).
ITS_2, mesinterepisternum (mesothoracic collar; possibly mesoprescutum).
l, lateral (morphologically posterior) direction.
lvc, lateroventral carina.
m, mesal (morphologically anterior) direction.
PEM_3, metapostepimeron.
pems, (meta-) postepimeral suture.
ps_2, mesopleural (humeral) suture.
ps_3, metapleural (second lateral) suture.
PSC_2, mesoprescutum (cephalic portion of mesoscutum).
PST, poststernum (intersternum).
PSTa, apical part of poststernum.
PSTb, basal part of poststernum.
SL_2, mesostigmal lamina (caudal part of mesostigmal plate).
SLV_2, mesostigmal lamina (plate), ventral part.
SP_2, mesospiracle (mesostigma).
SP_3, metaspiracle (metastigma).
ST_2, mesosternum.
ST_3, metasternum.
v, ventral (morphologically posterior) direction.

THE LINNAEAN NAMES OF INDO-AUSTRALIAN RHOPALOCERA. PART 1

By A. Steven Corbet, D.Sc., Ph.D., F.I.C., F.R.E.S.

(*British Museum (Natural History)*.)

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The works of Linnaeus containing descriptions of Indo-Australian Rhopalocera are listed below in chronological order. Reference is made also to the three parts of Clerck's *Icones*. Clerck employed the Linnaean binominal system for Lepidoptera, and the *Icones* contain accurate illustrations of many butterflies and moths, which were passed by Linnaeus before publication, and often cited in the Linnaean descriptions.

1758, C. Linnaeus, *Systema Naturae, Edition x* (Stockholm).
1759, C. Clerck, *Icones Insectorum rariorum*, I (plates 1–16) (Stockholm).
1763, C. Linnaeus, *Centuria Insectorum rariorum* (Upsala). [Later published in 1763, *Amoenitates Academicae* **6** : 384–415.]
1764, C. Linnaeus, *Museum Ludovicae Ulricae Reginae* (Stockholm).
1764, C. Clerck, *Icones Insectorum rariorum*, II (plates 17–55) (Stockholm).
[1765], C. Clerck, *Icones Insectorum rariorum*, III (supplementary plates 4–10). *Ined.*
1767, C. Linnaeus, *Systema Naturae, Edition xii*, I (Stockholm).
1768, C. Linnaeus, *Iter in Chinam* (Upsala). [Later published in 1769, *Amoenitates Academicae* **7** : 497–506.]
1771, C. Linnaeus, *Mantissa Plantarum, Generum editionis VI et Specierum II*, II (Vienna).

In the tenth edition of *Systema Naturae*, which forms the starting-point of zoological nomenclature, the Rhopalocera are placed in the single genus *Papilio*, which is divided into six phalanges. The species are numbered consecutively, the brief description is followed by a habitat, in some cases there are references to previously published descriptions and figures of other authors, and it is stated if the species is represented in the collection of the Swedish Queen Ludovica Ulrica.

In *Museum Ludovicae Ulricae Reginae* in 1764, Linnaeus described the insects, shells, etc., in the Royal Museum in considerable detail, but it is important to note that, in several instances, he so amended or amplified the description already published in *Edition x*, that it is evident that he was dealing with different species or forms. A large proportion of the specimens in the Royal collection still remained towards the end of the last century and they have been the subject of an exhaustive monograph by Aurivillius (1882, *Recensio critica Lepidopterorum Musei Ludovicae Ulricae quae descripsit Carolus a Linne* (Stockholm)). It mus tbe emphasised, however, that Aurivillius was concerned with the identification of species according to the names in *Mus. Lud. Ulr.*, which was not always the same thing as finding to which species the names published by Linnaeus in earlier works should be applied. At the present time, several Linnaean names are incorrectly employed because authors have failed to appreciate that Linnaeus occasionally used the same name for different forms in his different works.

The Linnaean publications cited above for the years 1763 and 1768 appear to have their modern equivalent in University theses for higher degrees. There seems to be little doubt that Linnaeus was the author of these works, and he, and not Johansson and Sparrman respectively, should be credited with the authorship of the names published in 1763 and 1768 (*vide* Aurivillius, 1913, *in* Seitz, *Grossschmett. Erde* **13** : 231). The theses were published separately and then reprinted as volumes of *Amoenitates Academicae.*

The twelfth edition of *Systema Naturae* contains rather brief descriptions of almost all the species denominated by Linnaeus in previous works : in some cases these descriptions have been amended and citations of figures added or altered, but many errors were copied from older publications, showing that no great care was expended on revision.

The remarkably accurate illustrations of Lepidoptera contained in Clerck's *Icones* are of great value in fixing many Linnaean names, for Clerck's figures usually were inscribed with the Linnaean name (believed to have been written by Linnaeus himself), and with the number of the species as arranged in *Edition x.*

According to Aurivillius (1882, *loc. cit.* : 5), the illustrations in Part II of the *Icones* are of typical specimens in the Museum of Queen Ludovica Ulrica. The unpublished supplementary plates and those in Part I are also important and will be considered in more detail later.

The evidence available for determining the species or form to which a Linnaean name refers is contained in :—

(*a*) the original description,
(*b*) the specimens in the Museum of Queen Ludovica Ulrica,
(*c*) Figures cited by Linnaeus in Clerck's *Icones*, and figures and descriptions in other works referred to by Linnaeus,
(*d*) Specimens remaining in Linnaeus' own collection.

It is important to examine the sources from which Linnaeus obtained the

material on which he based his descriptions in *Edition x*. Linnaeus had a collection of his own, but it is known that he also used the collection of Queen Ludovica Ulrica, now in Upsala University, and, according to Verity (1913, *J. linn. Soc. Zool.* **32** : 173), also that of Baron Charles De Geer, which contained palaearctic Lepidoptera and is now in the Royal Academy of Science, Stockholm. It appears also that Linnaeus named and described species known to him only from figures (*Papilio helena* is a case in point : *vide* Rothschild, 1895, *Nov. Zool.* **2** : 212).

Linnaeus made mistakes in the course of his work, and many obvious errors were perpetuated and copied from one publication to another. In several instances, descriptions are accompanied by entirely incorrect citations of figures, and in others, the description applies to one geographical race of a species while the figure cited depicts another. It will be generally conceded that a scientific name should not be applied to a species which cannot be reconciled with the original description.

Specimens in the Museum of Queen Ludovica Ulrica.

The specimens contained in the collection of Queen Ludovica Ulrica reached Upsala University via the collection of King Gustav IV Adolphus, and at Upsala they were catalogued and labelled with a trivial name (sometimes incorrect), and with a label " Mus. Gust. Adolph." by Thunberg. It appears doubtful if the specimens had labels written by Linnaeus when they reached Upsala, where they were incorporated in a general collection and not preserved separately. Aurivillius was able to separate these M.L.U. specimens from the others by means of Thunberg's labels, and he found that 105 species were represented. Aurivillius had access also to Linnaeus' private note-books and, with the aid of these and the Upsala specimens, he had little difficulty in interpreting the Linnaean names as published in *Mus. Lud. Ulr.* Aurivillius noted that, when transcribing notes for publication, Linnaeus occasionally changed descriptions and mixed different species. He found also that the M.L.U. specimens described by Linnaeus were, in many cases, figured in part II of Clerck's *Icones* and these he regarded as typical, except where an obvious error had crept in.

In *Edition x*, Linnaeus added the letters " M.L.U." to names based on specimens in the Museum of Queen Ludovica Ulrica. In my opinion, Aurivillius was correct in regarding these specimens as true types, for here Linnaeus definitely stated the location of the specimen or specimens examined.

In *Mus. Lud. Ulr.*, Linnaeus redescribed, not only the species marked " M.L.U." in *Edition x*, but many other species dealt with in *Edition x* which were not so indicated. It may be that the letters " M.L.U." were omitted in *Edition x* in error from these latter species, or it may be that Linnaeus saw them in another collection and that they passed subsequently into the Queen's collection.

Of the Indo-Australian forms of butterflies figured in Clerck's *Icones*, Part II, all except *polydorus*, *cydippe* and *thrax* [1] were marked " M.L.U." in *Edition x* or described later in *Mus. Lud. Ulr.* In the case of *polydorus* and *cydippe*, Aurivillius found specimens from the Queen's Museum, although they were not mentioned in *Mus. Lud. Ulr.* Leaving aside *thrax*, of the 24 Indo-Australian Rhopalocera figured in Part II of the *Icones*, 20 appear to have originated

[1] The figure of *thrax* in the *Icones* is that of the South American butterfly *Talides sinon* (Cram.).

from Amboina, 2 from Java and 2 from Ceylon. There is no evidence whatever to suggest that any of the specimens figured in Part II of the *Icones* were in Linnaeus' collection at the time when *Edition x* was published.

Leaving aside *demoleus* and *thamyras*, of the 9 Indo-Australian species marked " M.L.U." in *Edition x* but not figured in Part II of the *Icones*, all except *aonis* and *lemonias* occur in both Java and China : the description of *memnon*, however, fixes Java as the habitat in this particular case. With several of the remaining 8 species, Aurivillius found the specimens in the Queen's collection agreed best with published figures of Chinese forms, so that there seems little reason for disputing a Chinese habitat, although it is a little curious that no Chinese specimens are figured in Part II of the *Icones*.

Specimens in the Collection of Linnaeus.

Specimens described by Linnaeus which were not in the collection of Queen Ludovica Ulrica may have been in Linnaeus' own collection or, in the case of palaearctic forms, in that of De Geer, or they may have been known to the author only from figures in published or unpublished works.

In his own copy of the tenth and twelfth editions of *Systema Naturae*, Linnaeus marked the species of which he possessed specimens (Daydon Jackson, 1913, *Cat. Linn. Spec.* : 7). Of the species so indicated in *Edition x* it is important to note that :—

(i) all the eight species of Indo-Australian Rhopalocera figured in Clerck's *Icones*, Part I, are marked as being in Linnaeus' own collection;

(ii) of the 16 Indo-Australian species figured in the supplementary plates in the *Icones* and described in *Edition x*, 13 are marked as being in Coll. Linnaeus, the exceptions being *aglaja*,[2] which is figured as *pasitea* (*sic*), and *lemonias* and *c-aureum*, which were marked as being in the Linnaean collection in Linnaeus' copy of *Edition xii*.

It appears in the highest degree probable that all the butterflies figured in the first and supplementary parts of the *Icones* came from South-east China, and it is known that Linnaeus received Chinese specimens from several collectors.

It is difficult to escape the conclusion that the figures of Indo-Australian butterflies in Clerck's *Icones*, Part I and Supplement, are from specimens in Linnaeus' own collection, the only species figured and described in *Edition x* and yet not marked in Linnaeus' own copy of that work being *aglaja* and *lemonias* and *c-aureum*. Verity noticed a discrepancy between the palaearctic species marked by Linnaeus in his copy of *Edition x* and the specimens in the Linnaean collection now in the possession of the Linnean Society, and Daydon Jackson suggested that Linnaeus did the marking from memory. When possible, it will be of considerable interest to see if the Linnaean butterflies remaining in the Linnaean collection correspond to the figures of Clerck referred to above.

[2] That is, *Delias aglaia* auctt. and not the *Argynnis* species : the 13 *Edition x* species figured which were marked in Linnaeus' copy of *Edition x* are : *agamemnon, alimena, almana, chrysippus, demoleus, hecabe, leda, leucothoë* (i.e. *perius* and *hylas*), *memnon, midamus, mineus, panope* and *plexippus*. The " *alimena* " here referred to is *Vanessa canace* (Linn.) : see footnote no. 3.

Linnaean Names in *Systema Naturae*, *Edition x*.

A. *Species marked as being in the Collection of Queen Ludovica Ulrica.*

Of the Indo-Australian species of butterflies described in *Edition x*, 20 are marked " M.L.U.", and of these 6 are accompanied by figure citations of which 3 (*deiphobus*, *polytes* and *memnon*) cannot be reconciled with the original descriptions and clearly represent different species. There appears to be every justification for regarding these " M.L.U." specimens as true types in the case of 19 of these butterflies, the exception being *demoleus*, in which the original description agrees with the figure of Ehret cited, and can refer only to the Indo-Australian *Papilio demoleus* auctt., while the specimen in the Queen's Museum is that of the African *Papilio demodocus* Esper, to which the *Edition x* description cannot be applied fairly.

Seven of these 20 " M.L.U." species are marked in Linnaeus' copy of *Edition x* as being in his own collection,[3] but for reasons stated above it appears to me that the claims of the Linnaean specimens for being regarded as typical cannot be upheld against those by the Queen Ludovica Ulrica specimens.

The 20 Indo-Australian species marked " M.L.U." in *Edition x* and of which the types are or were in the collection of Queen Ludovica Ulrica are listed below. After each, in parentheses, is given the name applied in Seitz, vol. **9**, and what is now believed to be the country of origin of the type.

Papilio hector (Equites Trojani), 1758 : 459; Hab. in Indiis.
Type M.L.U. (Clerck, t. 33, fig. 1).
(*Papilio hector* Linn.; Ceylon.)

Papilio paris (Equites Trojani), 1758 : 459; Hab. in Asia.
Type M.L.U.
(*Papilio paris paris* Linn.; South-east China.)

Aurivillius found no specimen remaining in the Royal Museum, and he selected Clerck's figure (t. 13, fig. 1), of Chinese origin, as typical. Rothschild later (1895, *Nov. Zool.* **2** : 385) wrote " . . . typical *paris* is unquestionably the form from Continental India, as the habitat 'India or.' and the reference to Knorr's figure prove." I have given reasons for considering the Queen's specimens as types here and, in any case, there is no reason for supposing that the Queen or Linnaeus possessed specimens from India.

Papilio helenus (Equites Trojani), 1758 : 459; Hab. in Asia.
Type M.L.U.
(*Papilio helenus helenus* Linn.; South-east China.)

Papilio deiphobus (Equites Trojani), 1758 : 459: Hab. in Asia.
Type M.L.U. (Clerck, t. 25, fig. 1).
(*Papilio deiphobus deiphobus* Linn.; Amboina.)

[3] The 7 species in question are *paris*, *helenus*, *polytes*, *orithya*, *memnon*, *demoleus* and *alimena* : of these the first three are figured in Part I of the *Icones*, and *memnon* and *demoleus* are figured in the supplementary plates. The figure marked " *alimenia* [sic] *121* " in supplementary plate : t. 7, fig. 4 is not the *Hypolimnas* species, but represents *Vanessa canace*, probably of Chinese origin.

Papilio polytes (Equites Trojani), 1758 : 460; Hab. in Asia.
Type M.L.U.
(*Papilio polytes polytes* Linn., ♀ form *polytes* Linn.; South-east China.)

Papilio memnon (Equites Trojani), 1758 : 460; Hab. in Asia.
Type M.L.U.
(*Papilio memnon memnon* Linn. ♂; Java.)

Papilio panthous (Equites Trojani), 1758 : 461; Hab. in Indiis.
Type M.L.U. (Clerck, t. 19).
(*Papilio priamus priamus* Linn. ♀; Amboina.)

Papilio demoleus (Equites Achivi), 1758 : 464; Hab. in Asia. Ehret. pict. t. 5.
Type Ehret, *Plant. Papil. rar.* t. 5.
(*Papilio demoleus demoleus* Linn.; South-east China.)

Papilio eurypylus (Equites Achivi), 1758 : 464; Hab. in Indiis.
Type M.L.U. (Clerck, t. 28, fig. 2).
(*Papilio eurypylus eurypylus* Linn.; Amboina.)

Papilio perius (Danai Festivi), 1758 : 471; Hab. in Indiis.
Type M.L.U.
(*Pantoporia perius perius* Linn.[4]; South-east China.)

Papilio asterie (Nymphales Gemmati), 1758 : 472; Hab. in India.
Type M.L.U.
(*Precis almana almana* Linn., wet-season form; South-east China.)

The descriptions of *almana* and *asterie* in *Edition x* suggest dry- and wet-season forms respectively of a single species. No reference to " M.L.U." was given for *almana* in *Edition x*, while the reference to " M.L.U." under *asterie* doubtless referred to the specimen of the wet-season form found in the Queen's collection by Aurivillius. In *Mus. Lud. Ulr.* : 272, Linnaeus amended the description of *almana* so that it could refer only to the wet-season form, while he omitted the name *asterie* from this work. This alteration of names by Linnaeus has resulted in confusion regarding the nomenclature of *Precis almana*.

Precis aonis (Nymphales Gemmati), 1758 : 472; Hab. in Asia.
Type M.L.U.
(*Precis lemonias lemonias* Linn., dry-season form; South-east China.)

A comparison of the descriptions of *aonis* and *lemonias* in *Edition x* indicates that these are probably dry- and wet-season forms respectively of a single species. The single specimen found in the Queen's collection by Aurivillius is that of the dry-season form of *Precis lemonias* and a figure in Clerck's *Icones*, suppl. t. 7, fig. 2, depicts the same form. Linnaeus modified the description of *lemonias* in *Mus. Lud. Ulr.* : 277 so that it could apply only to the dry-season form, while he omitted *aonis* altogether. It is, perhaps, unfortunate that *aonis*

[4] Now known as *Parathyma perius*.

has page priority over the much better known name *lemonias*, but there is no reason for discontinuing the use of the latter name for the collective species, for the "first reviser" (Linnaeus, 1764, *Mus. Lud. Ulr.* : 277), used only "*lemonias*" (*vide* International Code of Zoological Nomenclature, Article 28).

Papilio lemonias (Nymphales Gemmati), 1758 : 473; Hab. in Indiis.
Type M.L.U.
(*Precis lemonias lemonias* Linn., wet-season form; South-east China.)

See remarks under *aonis* above.

Precis orithya (Nymphales Gemmati), 1758 : 473; Hab. in Indiis.
Type M.L.U.
(*Precis orithya orithya* Linn. ♀; South-east China.)

Papilio pipleis (Nymphales Gemmati), 1758 : 476; Hab. in Indiis.
Type M.L.U. (Clerck, t. 26, fig. 2).
(*Hypolimnas pandarus pandarus* Linn. ♀; Amboina.)

Papilio lampetia (Nymphales Gemmati), 1758 : 476; Hab. in Indiis.
Type M.L.U. (Clerck, t. 39, fig. 2).
(*Cupha lampetia lampetia* Linn.; Amboina.)

Papilio venilia (Nymphales Phalerati), 1758 : 478; Hab. in Calidis regionibus.
Type M.L.U. (Clerck, t. 32, fig. 4).
(*Rahinda venilia venilia* Linn.; Amboina.)

Papilio alimena (Nymphales Phalerati), 1758 : 478; Hab. in Indiis.
Type M.L.U. (Clerck, t. 32, fig. 1).
(*Hypolimnas alimena alimena* Linn. ♂; Amboina.)

Papilio bolina (Nymphales Phalerati), 1758 : 479; Hab. in India.
Type M.L.U. (Clerck, t. 21, fig. 2).
(*Hypolimnas bolina bolina* Linn. ♂; Java.)

Papilio thamyras (Plebeji Rurales), 1758 : 483; Hab. in Calidioribus regionibus.
Type M.L.U. (Aurivillius, 1882, *K. Sven. Vet.-Akad. Handl.* **19**, no. 2, fig. 5).
(*Amblypodia thamyras thamyras* Linn.[5] ♂; Amboina.)

B. *Species in the Collection of Queen Ludovica Ulrica, although not so marked, and not in the Collection of Linnaeus, and with no citation of figures.*

The descriptions of 12 species of Indo-Australian butterflies in *Edition x* contain no reference to figures or to specimens in the Queen's collection, although the species are described subsequently, and in more detail, in *Mus. Lud. Ulr.* None of these species is marked in Linnaeus' copy of *Edition x* as being in his

[5] Now known as *Arhopala thamyras*.

collection. It may have been that Linnaeus first saw the specimens in the Queen's collection and omitted to add the letters " M.L.U." against them in *Edition x* (although this seems unlikely), or he may have seen them in another collection, which later passed to the Royal Museum. As *Edition x* gives no clue to their identity, other than the description, there appears to be no reasonable alternative to regarding the specimens in Queen Ludovica's collection as the types. These species are listed below.

Papilio pandarus (Equites Trojani), 1758 : 461; Hab. in Indiis.
Type M.L.U. (Clerck, t. 26, fig. 2 as " *pipleis* ").
(*Hypolimnas pandarus pandarus* Linn. ♀; Amboina.)

Papilio ulysses (Equites Achivi), 1758 : 462; Hab. in Asia.
Type M.L.U. (Clerck, t. 23, fig. 1).
(*Papilio ulysses ulysses* Linn. ♂; Amboina.)

Papilio pyrrhus (Equites Achivi), 1758 : 462; Hab. in Indiis.
Type M.L.U. (Clerck, t. 25, fig. 2).
(*Eriboea pyrrhus pyrrhus* Linn.[6] ♂; Amboina.)

Papilio urania (Heliconii), 1758 : 466; Hab. in Indiis.
Type M.L.U. (Clerck, t. 29, fig. 3 as " *cassiae* ").
(*Tenaris urania urania* Linn.[7] ♀; Amboina.)

Papilio hyparete (Danai Candidi), 1758 : 469; Hab. in Indiis.
Type M.L.U. (Clerck, t. 38, fig. 2).
(*Delias hyparete hyparete* Linn. ♂; Java.)

Papilio aeropa (Nymphales Gemmati), 1758 : 475; Hab. in Indiis.
Type M.L.U. (Clerck, t. 39, fig. 1).
(*Euthalia aeropa aeropa* Linn. ♂; Amboina.)

Usually misspelt " *aeropus* ", which is the spelling employed in *Mus. Lud. Ulr.* : 256 and in *Edition xii* : 768.

Papilio clytia (Nymphales Phalerati), 1758 : 479; Hab. in Indiis.
Type M.L.U.
(*Papilio clytia clytia* Linn., form *clytia* Linn.; South-east China.)

It does not appear that Aurivillius found a specimen of *clytia* remaining in the Queen's collection.

Papilio polycletus (Plebeji Urbicolae), 1758 : 485; Hab. in Indiis.
Type M.L.U. (Clerck, t. 17, fig. 2).
(*Hypochrysops polycletus* Linn. ♀; Amboina.)

[6] Now known as *Polyura pyrrhus*.
[7] The generic name is misspelt *Taenaris* in Seitz.

Papilio hylas (Barbari), 1758 : 486; Hab. in Indiis.
Type M.L.U.
(*Neptis hylas hylas* Linn.; South-east China.)

Papilio amphion (Barbari), 1758 : 486; Hab. in Indiis.
Type M.L.U.
(*Neptis amphion amphion* Linn.; Amboina.)

Papilio telamon (Barbari), 1758 : 486; Hab. in Indiis.
Type M.L.U. (Clerck, t. 40, fig. 4 as "*hylas*").
(*Cyrestis telamon telamon* Linn.; Amboina.)

Papilio ceneus (Barbari), 1758 : 487; Hab. in Indiis.
Type M.L.U. (Clerck, t. 38, fig. 3 as "*hyparete*").
(*Delias ceneus ceneus* Linn. ♀; Amboina.)

Often misspelt "*caeneus*", which is the spelling adopted in *Edition xii* : 766.

C. *Species known to Linnaeus only from published figures.*

The allocation of the remaining Indo-Australian species in *Edition x* is more involved, but two names which require individual consideration can be easily disposed of.

(*a*) The arguments advanced by Rothschild (1895, *Nov. Zool.* **2** : 212) make it clear that Linnaeus had not seen a specimen of *helena* at the time that he wrote the description for *Edition x*, and the type can only be the Merian figure he cited.

Papilio helena (Equites Achivi), 1758 : 461; Hab. in Arecae Americes. Mer. surin. in tabula titulo praefixa, figura maxima.
Type Merian, *Surinaamsche Insecten*, tab. tit. praefix.
(*Papilio helena helena* Linn. ♂; Java.)

(*b*) The *Edition x* description of *glaucippe* contains no reference to "M.L.U.", nor is the species marked in Linnaeus' own copy as being in his collection. The type, therefore, can only be the figure cited by Linnaeus.

Papilio glaucippe (Danai Candidi), 1758 : 469; Hab. in Asia. Edw. av. 128, t. 128.
Type Edwards, *Nat. Hist. Birds* : 128, t. 128.
(*Hebomoia glaucippe glaucippe* Linn. ♂; South-east China.)

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